REMARKS

INTRODUCTION

In accordance with the foregoing, claims 1, 3, 7, 9, 13 and 15 have been amended. Claims 2, 5, 6, 8, 10-12, 14, 22-24 and 26-29 have been cancelled. Claims 1, 3, 4, 7, 9, 13, 15-21, 25 and 30 are pending and under consideration.

CLAIM REJECTIONS

Claims 1, 7, 10-13, 18, 22 and 26-29 were rejected under 35 U.S.C. 102(b) as being anticipated by Plunkett (US 4,093,900) (hereinafter "Plunkett").

Claims 2-6, 8, 9, 14-17, 19-21, and 23-25 were rejected under 35 U.S.C. 103(a) as being unpatentable over Plunkett in view of Youn et al. (US 6,369,538) (hereinafter "Youn").

Plunkett discloses a system for blending both dynamic and regenerative electrical braking of the motor whenever it decelerates. In Plunkett, the power source 18 will in most instances be neither totally receptive nor totally non-receptive to regenerative current but will generally be capable of absorbing some percentage of the motor braking current. However, if the source 18 is excessively receptive, i.e., the source voltage is low, the inverter current will tend to rise while the inverter voltage will tend to fall. Since the impulse commutated inverter's ability to commutate current is dependent on the inverter d-c voltage, an excessively receptive line may result in damage to the power conversion apparatus 12 unless the commanded braking torque is reduced. At the other extreme of receptivity, the voltage of power source 18 will rise to an excessive level as regenerative current is pumped back and may result in damage to the semiconductor components of the power control system unless some action is taken to control the regenerative current. Accordingly, there is connected to power regulating circuit 34 a protection circuit 55 which establishes upper and lower voltage limits for power conversion apparatus 12 and operates to modify the braking or motoring torque commands in order to maintain the inverter voltage within the prescribed limits. Plunkett, 6:49-7:3.

Youn discusses a method for rapidly and smoothly braking a washing machine by treating a revival voltage of the motor braking with hardware and software. Youn, 3:57-3:61. In Youn, the process of controlling each switching device Q1~Q6 and diode D1~D6 of the motor

driver 203 is repeated as the phase and the duty ratio of the control pulse corresponding to the detected voltage V_{DC} and the speed varies. As a result, the motor M is stopped smoothly. In the event that the detected voltage V_{DC1}, V_{DC2} exceeds the reference voltage V_{ref}, then it is considered as the emergence braking circumstance and the switching device Q7 of the emergence braking device 207 is turned to on state. As the switch is turned on, the revival voltage is discharged in a form of thermo energy by the dynamic braking resistor R2 connected in between the switching device collector and the capacitor filter 202 and motor driver 203. Youn, 6:26-6:39 and Figure 4.

Claims 1-6

Amended claim 1 recites: "...wherein the overcurrent consumed by the brake resistors is changed in proportion to a duty cycle of the first and second switching units turned on and turned off by the switching controller." Support for this amendment may be found in at least original claim 2. Plunkett does not discuss that the overcurrent consumed by the brake resistors is changed in proportion to a duty cycle of the first and second switching units. This deficiency in Plunkett is not cured by Youn. In Youn, when the detected voltage exceeds the reference voltage, then it is considered a separate braking circumstance and another switching device Q7 is turned on. As the switch is turned on, the revival voltage is discharged in a form of thermo energy by the dynamic braking resistor R2 connected in between the switching device collector and the capacitor filter 202 and motor driver 203. That the overcurrent to the brake resistors is changed in proportion to the duty cycle of the first and second switching units, as recited in claim 1, is not discussed in either Plunkett or Youn.

Claims 3 and 4 depend on claim 1 and are therefore believed to be allowable for at least the foregoing reasons. Claims 2, 5 and 6 have been cancelled.

Withdrawal of the foregoing rejection is requested.

Claims 7-9

Amended claim 7 recites: "...wherein the overcurrent consumed by the brake resistors is changed in proportion to a duty cycle of the one of the first and second the switching units turned on and turned off." Support for this amendment may be found in at least original claim 8. Plunkett does not discuss that the overcurrent consumed by the brake resistors is changed in proportion to a duty cycle of the one of the first and second switching units. This deficiency in Plunkett is not cured by Youn. In Youn, when the detected voltage exceeds the reference

voltage, then it is considered a separate braking circumstance and another switching device Q7 is turned to the on state. As the switch is turned on, the revival voltage is discharged in a form of thermo energy by the dynamic braking resistor R2 connected in between the switching device collector and the capacitor filter 202 and motor driver 203. That the overcurrent to the brake resistors is changed in proportion to the duty cycle of on of the first and second switching units, as recited in claim 7, is not discussed in either Plunkett or Youn.

Claim 9 depends on claim 7 and is therefore believed to be allowable for at least the foregoing reasons. Claim 8 has been cancelled.

Withdrawal of the foregoing rejection is requested.

Claims 10-12

Independent claims 10, 11 and 12 have been cancelled.

Claims 13-21 and 25

Amended claim 13 recites: "...wherein the overcurrent consumed by the brake resistors is changed in proportion to a duty cycle of the switching units turned on and turned off by the controller." Support for this amendment may be found in at least original claim 14. Plunkett does not discuss that the overcurrent consumed by the brake resistors is changed in proportion to a duty cycle of the switching units. This deficiency in Plunkett is not cured by Youn. In Youn, when the detected voltage exceeds the reference voltage, then it is considered a separate braking circumstance and another switching device Q7 is turned to an on state. As the switch is turned on, the revival voltage is discharged in a form of thermo energy by the dynamic braking resistor R2 connected in between the switching device collector and the capacitor filter 202 and motor driver 203. That the overcurrent to the brake resistors is changed in proportion to the duty cycle of the switching units, as recited in claim 13, is not discussed in either Plunkett or Youn.

Claims 15-21 and 25 depend on claim 13 and are therefore believed to be allowable for at least the foregoing reasons. Claim 14 has been cancelled.

Withdrawal of the foregoing rejection is requested.

Claims 22-24 and 26-29

Independent claims 22, 26, 27, 28 and 29, and dependent claims 23 and 24 have been cancelled.

RESPONSE TO ARGUMENTS

On page 6, numbered paragraph 5, of the Office Action, the Examiner stated that Plunkett discussed that any overcurrent that occurs is proportional to the motor speed and controlled. In response, please note that a switching controller in the present invention turns on/off one of the first and second switching units provided in respective opposite ends of the inverting part when a dynamic braking is operating. Thus overcurrent consumed by the brake resistor is controlled. By contrast, Plunkett (5:60-6:25 and 7:30-7:49) discusses the controlling of the motor speed through the inverter when driving the motor, but does not discuss that the regulating circuit 34 of Plunkett, corresponding to the switching controller of the present invention, controls the power conversion when the dynamic braking is operating.

CONCLUSION

There being no further outstanding objections or rejections, it is submitted that the application is in condition for allowance. An early action to that effect is courteously solicited.

Finally, if there are any formal matters remaining after this response, the Examiner is requested to telephone the undersigned to attend to these matters.

If there are any additional fees associated with filing of this Amendment, please charge the same to our Deposit Account No. 19-3935.

Respectfully submitted,

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Date: Feb 27, 2006

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